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11 December 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 125

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BRIEFS

NUCLEAR REACTOR PROGRESS--The country's first nuclear research reactor which is the heart of Bangladesh Atomic Energy Commission (BAEC) Savar Complex will be critical well ahead of schedule time, says a Press release This was stated to the newsmen by Dr. R.A. Ghani, Minister of State for Science and Technology on Wednesday morning while visiting the under-construction reactor building at Savar, 25 miles away from Dacca city. The 3-Megawatt Triga Mark-II research reactor of USA origin which can play a vital role on the country's economy will be placed in it. The Minister informed that the reactor will produce radoi-isotope required for agriculture industry, and nuclear medicine including manpower training in reactor technology, nuclear Chemistry, solid state physics, electronics, nuclear engineering and nuclear power programme Later the Minister visited the Building Research Institute at Mirpur. He stressed the need for low cost building and asked the concerned engineers to erect low cost building at different parts of the country to popularise their research findings. [Text] [Dacca THE BANGLADESH OBSERVER in English 22 Oct 81 p 1]

CSO: 5100/7020

UN DELEGATE SPEAKS ON NUCLEAR CONFRONTATION

New Delhi PATRIOT in English 24 Oct 81 p 3

[Text] United Nations, Oct 23 (UNI)

India has charged the super powers with pushing mankind, 'closer to a nuclear catastrophe than ever before.'

Addressing the United Nations Political and Security Committee yesterday, Indian delegate S.M. Krishna, MP, said 'We are today closer to a nuclear catastrophe than at any other time since the dawn of the atomic age.'

'This' the Indian representative said, was 'the result of the policies of confrontation followed by the major powers and the relentless build-up of armaments that they have been engaged in.

'The relations between the two major nuclear powers and the alliance systems headed by them have taken a turn for the worse during the recent months and the language of the cold war of the fifties is being heard again with a new stridency,' he said.

Mr Krishna said the greatest threat to human survival today stemmed from the danger of the outbreak of a nuclear war and that was why the General Assembly's first special session on disarmament had given the highest priority to elimination of atomic weapons.

'Despite this clear cut commitment of the international community,' Mr Krishna said, 'attempts are still being made to shift the focus of disarmament efforts to issues such as conventional disarmament.'

While India is not opposed to conventional disarmament, it believes that efforts in this direction must be conceived in the overall context of achieving general and complete disarmament, he added.

Mr Krishna listed the priorities as: Reduction in nuclear weapons, other weapons of mass destruction, including chemical weapons, conventional weapons and conventional armed forces.

He said since the very nuclear weapon powers were also the bulk producers and suppliers of conventional armaments, any measure of conventional disarmament must first and foremost be the responsibility of these states.

He said developing countries could not be denied the means to defend their political independence--in many cases only recently won--while a handful of states accumulated vast arsenals of nuclear and conventional weapons.

He said creation of nuclear weapon-free zones also would make sense only if accompanied by measures of nuclear disarmament. 'If a nuclear war breaks out nuclear weapons-free zones will not escape from its cataclysmic effects.'

Mr Krishna said, 'at a time when detente was a more respectable word, India had pointed out that, to be enduring, detente must extend to all parts of the globe.

Mr Krishna said a general and complete disarmament besides eliminating the danger of war and the use of force in international relations, would also release real resources for economic and social development of the depressed countries of the South.

Ordinary people the world over have been coming out in thousands to protest against the arms race, he said. 'It would be a mistake to interpret these sustained and spontaneous waves of popular dissent as pacificism or unrealistic idealism. They are in fact an expression of man's basic instincts for survival.'

CSO: 5100/7014

INDIA

REDDY OPENS NUCLEAR DISARMAMENT FORUM

Calcutta THE SUNDAY STATESMAN in English 25 Oct 81 pp 1, 7

[Text] RAJGIR, Oct 24.—The introduction of nuclear weapons into the arsenals of nations has brought about a radical change, and war and peace are now the concern of every nation, according to the President, Mr N. Sanjiva Reddy, report PTI and UNI.

Inaugurating the Venu Vihar and the international forum of nuclear disarmament and prevention of nuclear war here today, Mr Reddy said that formerly war was the concern of only those fighting it while other nations in the world were not affected.

"Today", Mr Reddy said "war fought with nuclear weapons would mean the bursting of enough bombs and consequent radioactive fall-out to foul the air, water and soil of the whole planet and mankind could be condemned to death and disease, without distinction".

"There exists thousands of nuclear weapons of different kinds and destructive strength in the hands of the nuclear weapon States. On the other hand, we also learn that we have the means of producing unlimited energy anywhere in the world by nuclear reaction which could be used for peaceful and constructive work", he added.

Referring to scientific and technological developments of the last three decades, Mr Reddy said there were three possible ways in which the nuclear space age could affect human civilization.

The first is total destruction of civilisation by a full-scale nuclear war, the President said.

The second, he said was the continuation of the present phase of nuclear stalemate, expanding population and limited increase in food production and subsequent perpetuation of hunger, privation and misery" further accentuating the gulf between the rich and poor".

The third was "plentiful generation of energy and food, elimination of disease so that mankind may not only have freedom from want, hunger and illness but plenty of leisure in which to develop the fine arts", Mr Reddy added.

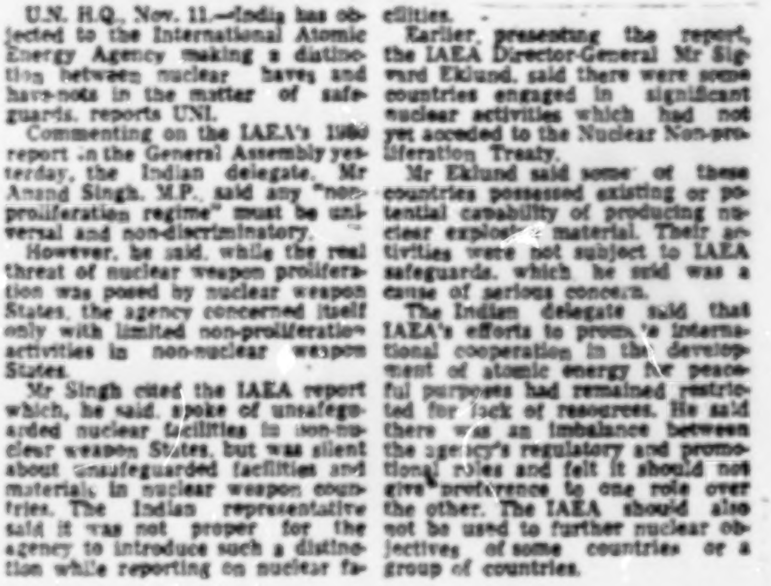
"Before we can hope to change our present state and grasp the utopia depicted in the third possibility we have to devise means by which the first possibility can be averted, the President said adding in the present nuclear age, war was unimaginable as an instrument of policy".

Speaking on the occasion, the Bihar Governor, Mr A. R. Kidwai, said the scientific discoveries of today should be utilised for the good of mankind. Modern science had helped us to utilise space and atomic energy for human prosperity and for the alleviation of human suffering, he added.

INDIA SCORES IAEA REPORT ON NUCLEAR FACILITIES

Calcutta THE STATESMAN in English 12 Nov 81 p 8

[Text]



U.N. H.Q., Nov. 11.—India has objected to the International Atomic Energy Agency making a distinction between nuclear haves and have-nots in the matter of safeguards, reports UNI.

Commenting on the IAEA's 1980 report in the General Assembly yesterday, the Indian delegate, Mr Anand Singh, M.P., said any "non-proliferation regime" must be universal and non-discriminatory.

However, he said, while the real threat of nuclear weapon proliferation was posed by nuclear weapon States, the agency concerned itself only with limited non-proliferation activities in non-nuclear weapon States.

Mr Singh cited the IAEA report which, he said, spoke of unsafeguarded nuclear facilities in non-nuclear weapon States, but was silent about unsafeguarded facilities and materials in nuclear weapon countries. The Indian representative said it was not proper for the agency to introduce such a distinction while reporting on nuclear facilities.

Earlier, presenting the report, the IAEA Director-General Mr Sigvard Eklund, said there were some countries engaged in significant nuclear activities which had not yet acceded to the Nuclear Non-proliferation Treaty.

Mr Eklund said some of these countries possessed existing or potential capability of producing nuclear explosive material. Their activities were not subject to IAEA safeguards, which he said was a cause of serious concern.

The Indian delegate said that IAEA's efforts to promote international cooperation in the development of atomic energy for peaceful purposes had remained restricted for lack of resources. He said there was an imbalance between the agency's regulatory and promotional roles and felt it should not give preference to one role over the other. The IAEA should also not be used to further nuclear objectives of some countries or a group of countries.

CSO: 5100/7018

ATOMIC ENERGY DEPARTMENT PLANS, PROGRESS NOTED

Madras THE HINDU in English 12 Nov 81 p 6

[Text] BOMBAY, Nov 11.

The Department of Atomic Energy is now working on the design of the large size 500 MW nuclear power units.

This was stated by Dr. Homi N. Sethna, Chairman of the Atomic Energy Commission, at the international scientific forum on changes in energy now in session in Mexico.

He added that in fact many of the components for the Narora station had been designed to permit easy transition to the 500 MW size.

On the fast breeder programme, Dr. Sethna said that the major components of the fast breeder test reactor (at Kalpakkam in Tamil Nadu) were fabricated in India. The feasibility of 500 MW fast breeder reactors was also being examined.

Dwelling on the present plan for construction of ten more units of 235 MW each of the Narora type station in addition to the nuclear power plants now under operation or construction, Dr. Sethna expressed his confidence in the ability of the Indian industry to tackle the new technologies and hoped that the construction period of these new stations would be reduced progressively.

He was of the opinion that individual developing countries had to undertake detailed studies based on their own experience and conditions and thereafter plan their own programmes best suited to their needs. He offered India's cooperation in sharing its experience with the other developing countries. "We are equally anxious to learn from the experience of other developing countries," he added.

The international forum which started in Mexico on Monday is expected to conclude on Friday.

Commercial production of silicon solar cells

PTI reports from New Delhi:

The silicon solar cells, developed by the Bhabha Atomic Energy Research Centre, are now poised for commercial production, according to the Department of Atomic Energy (DAE).

The knowhow for these solar cells has been transferred to BHEL, which has got a Rs. 3.5 crores order from the Department of Space for supplying one lakh solar cells.

The indigenous solar cells, first tested aboard the Indian satellite, Bhaskara, were later used on a solar panel to meet part of the power requirement of Rohini Satellite 1 which was launched in July last year.

The solar cells which have proved their space-worthiness have even greater potential for large scale power generation to meet energy needs on earth, according to the DAE.

But as they are prohibitively expensive now the DAE is pursuing two approaches to bring down the cost per unit watt, to make cells an economically viable proposition. One is to get higher efficiency possibly at higher cost and the other is to produce less expensive cells possibly at lower efficiency.

The DAE is also considering a proposal to use the advanced solar cells on satellite for solar power stations (SSPS). These stations placed in geostationary orbits would convert solar energy into electricity and transmit it to earth as microwaves by using amplitrons. On ground the microwave energy can be converted and fed into the existing power grids.

The yardstick DAE will use in future, for assessing the large scale conversion of sunlight on ground would be in terms of energy-cost-effectiveness rather than money-cost-effectiveness.

According to the concept, the useful operating life of the photovoltaic system must be long enough so that more energy is made available by it than is needed to make it.

The DAE feels it would be necessary to build and operate a terrestrial solar breeder plant which will manufacture solar cells using solely solar energy.

CSO: 5100/7019

INDIA

PRESS REPORTS KRISHNA REMARKS ON NUCLEAR PROBLEMS

Fuel Restraints Deplored

Calcutta THE STATESMAN in English 4 Nov 81 p 4

[Text] U.N. H.Q., Nov. 3--India yesterday deplored the imposition of "unilateral restraints" on the export of nuclear fuel, equipment and material supplies to developing countries, reports PTI.

The Indian delegate, Mr S. M. Krishna, M.P., said such actions affected the developing countries' economic progress. It also widened the technological gap between the advanced and the Third World countries.

Mr Krishna rejected in advance the Pakistani proposal for the establishment of nuclear-free zone and regretted the "systematic dilatory tactics" adopted by the Big Powers to block the Indian Ocean this year in Sri Lanka.

On the restraints imposed by the nuclear material supplier States, he said: "... The international community must reject the view that the spread of nuclear technology necessarily and inevitably increases the risk of horizontal proliferation of nuclear weapons"

"The problem of proliferation of nuclear weapons, both in its vertical and horizontal aspects, is essentially a political and not a technical problem, and must be solved through political means. One of the most vital components of such a political solution is the urgent negotiation of concrete measures of nuclear disarmament, for which special responsibility rests with the nuclear weapon States", he said.

"We continue to believe that the proposal to set up a nuclear weapon-free zone in south Asia, does not, in any of its aspects, meet these requirements," he said.

"One should not ignore the fact that nuclear weapons were deployed in the Asia-Pacific region, foreign bases were being maintained and more were being sought in the Indian Ocean. The proposal had been put forward without any prior consultations. For all these reasons, India opposed it", he added.

Nuclear-Free Zone Rejected

New Delhi PATRIOT in English 4 Nov 81 p 3

[Text] United Nations, Nov 3 (UNI)--India has said the proposal to establish a nuclear weapon free zone in South Asia had been made in "flagrant violation" of internationally accepted principles and would not get Indian support.

"Our opposition to the proposal has been consistent and clear cut" said delegate S M Krishna, MP, during the UN political and security committee's annual general debate on disarmament topics yesterday.

The Indian representative gave three reasons for his country's position.

"The creation of such zones makes sense only if they are conceived of as part of a credible programme for the urgent achievement of nuclear disarmament."

"The region to be covered by any such zone must be viable in the sense that it is a well-defined geographical and geopolitical unit."

"The initiative for the creation of such zones must come from the countries of the region concerned and follow a process of mutual consultations among them".

The Indian delegate said, "we continue to believe that the proposal to set up a nuclear weapon free zone in South Asia does not, in any of its aspects, meet these requirements."

Mr Krishna said South Asia was an integral part of the Asia Pacific region and could not be artificially isolated as a self-contained entity.

"Nor should one ignore the fact that nuclear weapons are deployed in the Asia-Pacific region and foreign military bases are maintained, and more are being sought in the Indian Ocean".

Mr Krishna said the proposal had been put forward (by Pakistan without any prior consultations among the countries concerned. "The situation is also complicated by the fact that not all countries belonging to South Asia share common perceptions and security concerns," he said.

He said "should such a proposal be presented to the committee again this year, in defiance of the internationally accepted principles that must be observed in the establishment of nuclear weapon free zones, India will, as in the past, reject it emphatically."

Mr Krishna hoped, 'members of this committee, all of whom have subscribed to these principles without reservation, will not countenance their flagrant violation, which is so patently evident in this proposal."

CSO: 5100/7015

INDIAN APPROACH RELEVANT FOR MANY DEVELOPING COUNTRIES

Kuala Lumpur BUSINESS TIMES in English 21 Oct 81 p 6

[Article by Ho Sook Han]

[Text] "NEUTRONS smell," protests the home-made sign draped from the window of a dreary row of flats on Bombay's Pedder Road.

The anti-nuclear message is unusual in a country which apparently has "no problems with public acceptance of nuclear power," as Dr H.N. Sethna, chairman of India's Atomic Energy Commission, asserts.

Dr Sethna goes so far as to say that the current dispute with the US over the continued supply of enriched uranium for the 400 MW Tarapur power plant, a few miles north of Bombay, will only "strengthen India's determination to be completely self-sufficient in nuclear power production in the long run."

India's plans are certainly ambitious. It presently has two nuclear power stations with a total capacity of 860 MW and two more are under construction. One of them, near Madras, is expected to be commissioned next year.

Targets for the next 20 years involve the installation of some ten more reactors of the type being constructed to be followed by about a dozen larger 500 MW reactors.

Reactors now in operation and under construction account for only about 1,300 MW or only 4.3 per cent of current installed capacity of 30,000 MW.

Even with the expected increase in investment in nuclear power plants, the contribution of nuclear power to total installed capacity will decrease. Coal and hydro are expected to be the major power sources.

Total installed capacity by the year 2000 has been estimated, perhaps unrealistically, to come to about 710,000 MW and of this, 10,000 MW or 1.4 per cent is expected to come from nuclear power plants.

In contrast, Malaysia has shelved its full scale nuclear power programme at least until the next century. The country's sole reactor, the 1 MW Puspati, which is expected to be commissioned this December, is mainly for research purposes.

Malaysia seemed ready to consider seriously a nuclear power programme during the mid-70s but with increased certainty about the availability of other resources such as coal, natural gas, oil and hydro, the energy picture changed substantially.

In addition, nuclear power plants do not come cheap. Prices of uranium — the basic raw material for nuclear energy — have shot up; so has the cost of construction — and Malaysia would have to depend almost entirely on foreign imports of uranium as well as technology.

Environment and safety factors are also involved. Malaysia, however, has not given up on nuclear power altogether. The National Electricity Board retains a nuclear power unit which is expected to keep abreast of the latest developments in the field.

Ms Bebe Chooi, research head of Petronas, says the nuclear option makes sense only for such uranium-rich countries as the US and France and those which have no indigenous energy resources such as South Korea and Japan.

India belongs to the first group of countries. Its uranium deposits, mostly in the state of Bihar, are estimated at 52,000 tonnes.

The Indian government is also anxious about the urgency of meeting energy needs especially in view of the growing scarcity of traditional energy sources such as firewood.

There are regions in the country which are far away from coal, oil, gas or hydro resources. These factors explain why India went ahead with nuclear power stations despite the fact that the initial investment and gestation period are greater than for coal-fired power plants.

In this India is unique as it is the only developing country and one of a select handful, to have the complete nuclear cycle, right from uranium exploration, mining, extraction and conversion through to fuel fabrication, heavy water production, reprocessing and waste management.

The present design of nuclear power plants is based on heavy water reactors using natural uranium as fuel. Heavy water, which has one extra neutron attached to each of the two hydrogen atoms, is thousands of times more efficient than ordinary or "light" water. Tarapur, India's first atomic power reactor, is the only one to use enriched uranium which produces energy more readily.

It consists of two 200 MW boiling water reactors and has completed 11 years of service.

The second power plant at Kota, in north west India, consists of two 220 MW reactors and was a joint venture with Canada. Indians were responsible for building and installing while Canadians supplied the designs and equipment.

India's nuclear power programme has not been governed by the convention that 600 MW is the minimum economic size for a nuclear power plant.

The largest plants set up so far are 470 MW which is felt to be an appropriate size for India's current needs. Dr Sethna expects that in future, instead of having twin reactors at one site, there would be more optimal use of the highly specialised manpower required to operate and maintain the installations if four reactors were located at a given site.

Nuclear power in India has not only been demonstrated to be an economically competitive and safe source of energy, Dr Sethna declares, but it has also "speeded up the scientific, technical and industrial development of the country as a whole."

The techniques developed for the extrusion of Zircaloy, a nuclear fuel, have been applied in the extrusion of alloy steel tubes for use in the petroleum industry, explains Dr Sethna.

The experience gained on nuclear projects has been transplanted to the field of civil construction, he adds.

Perhaps the most notable feature of India's nuclear power programme, which Indian officials are quick to point out to visitors, is the considerable degree of self reliance.

The trial and error approach was evident right from the start when a research reactor was designed and built wholly by Indians who had little experience in some of the techniques.

India has also gradually reduced the import component of its nuclear projects.

The import content of the first Kota unit for instance was 45 per cent while it is only nine per cent for the latest unit.

The third power station consisting of two 235 MW reactors now being put up near Madras is being built without reliance on foreign engineering or scientific expertise.

The fourth power plant being built at Narora in north west India also consists of two 235 MW reactors which have several new Indian-designed features, including building and reactor components which are earthquake-proof.

"India has reached the stage where its indigenously developed know-how can support all the required activities encompassing feasibility studies, site selection, detailed project design, construction commissioning and operation of any plant in the entire fuel cycle chain," Dr Sethna claims.

This trial and error approach undoubtedly has relevance for many developing countries which have tended to depend too heavily and perhaps indiscriminately on Western technology.

It is something Malaysia, which has sent many of its engineers and technicians to India for training in nuclear development, would do well to remember when it finally decides whether to take up the nuclear option.

CSO: 5100/3101

BRIEFS

GANDHI DENIES FRENCH URANIUM SUPPLY--The prime minister told the Rajya Sabha that every effort is being made to undertake research and development in all aspects of peaceful uses of nuclear energy and to keep the country abreast of the latest developments. Mrs Gandhi described as incorrect a newspaper report that the French Government had decided to consider favorably the question of supplying of enriched uranium for the Tarapur plant. [Text] [BK261125 Delhi Domestic Service in English 0830 GMT 26 Nov 81]

NUCLEAR-ARMS-FREE OUTER SPACE--United Nations, Oct 30 (PTI)--India yesterday urged that outer space, by agreement, must be kept free of nuclear weapons and nuclear testing of any sort. In addition, India also renewed strongly its plea for concluding two more agreements regarding nuclear weapons--an agreement on the total prohibition of the use or threat of use of nuclear weapons, and, a treaty prohibiting the testing of nuclear weapons in all environments, by all states, for all time to come. Indian ambassador to the United Nations at Geneva and India's representative at the disarmament talks A.P. Venkateswaran regretted, that, despite heightened awareness of the dangers of a nuclear war and its potential for the annihilation of mankind, there was delay in reaching consensus on concrete steps to avert such a danger. He said that the nuclear arms race was accelerating despite the achievement and maintenance of so-called strategic party. New weapon technologies had been spawned and incorporated into the nuclear arsenals of the nuclear weapons states, he said. Mr Venkateswaran referred to the development of missiles with more accurate warheads and the new neutron bombs by the United States and said the achievement of so-called strategic parity had not helped to halt the arms race. Calling for urgent measures for the prevention of a nuclear war, Mr Venkateswaran said the only real guarantee was for the nuclear powers to agree on a total prohibition of the use or threat of use of nuclear weapons under any circumstances. [Text] [New Delhi PATRIOT in English 31 Oct 81 p 3]

CSO: 5100/7016

UN ENVOY: POOR STATES MUST HAVE ACCESS TO NUCLEAR TECHNOLOGY

Karachi DAWN in English 12 Nov 81 pp 1, 12

[Text] United Nations, Nov 11--Pakistan told the General Assembly last night that the concern for nuclear non-proliferation should not militate against the inherent right of the developing countries to benefit from peaceful nuclear technology on a universal and non-discriminatory basis, reports APP's special correspondent.

"We believe that nuclear proliferation cannot be prevented by placing unilateral restrictions on access to nuclear technology," Ambassador Niaz A. Naik said.

That objective could be achieved through a genuine political consensus, embracing nuclear and non-nuclear countries, he said in a well-reasoned speech while discussing the report of the international Atomic Energy Agency (IAEA) Director-General, Mr Sigvard Eklund.

Mr Naik said Pakistan fully supported the IAEA safeguards system and, in the context of its own nuclear facilities, extended every assistance to the Agency in discharging its safebuard responsibilities. Nevertheless, in the recent past, Pakistan's peaceful nuclear programme had become the target of an "orchestrated propaganda campaign."

It was being said that "suspicious" activities had come to light at Pakistan's nuclear reactor near Karachi and that "anomalies and irregularities" had been detected at the site. Those were patently false allegations which cast doubt on the Agency's competence, the Pakistan Ambassador said.

These unfounded allegations, he said, should have been refuted by the Agency itself in the light of its inspections of the Karachi nuclear reactor. "We have, however, noted the categorical statement by the Director-General of IAEA that the Agency had neither detected any diversion nor any act of non-compliance of its safeguards regime."

The Karachi Nuclear Power Plant had been regularly inspected by the Agency's safeguards inspectors, Mr Naik stated. During the past 10 years, it had been inspected 62 times and on each occasion the Agency had certified that "the inspection disclosed no departure from the terms of the safeguards agreement covering the facilities and materials concerned."

There had not been a single case of non-compliance or deviation, he said. The conjecture regarding diversion of irradiated fuel from the nuclear power plant were totally baseless, misleading and contrary to the official statements and findings.

Mr Naik said Pakistan's experience showed that the IAEA safeguards system was reliable and effective, covering the entire nuclear fuel cycle. However, the safeguards system must be protected and universalised on a non-discriminatory basis.

The Israeli attack on the Iraqi nuclear reactor had come as a rude shock to the international community, he said. Director-General Sigvard Eklund had correctly described it as an attack on the IAEA safeguards system itself. The Israeli attack had far-reaching implications and underlined the imperative need to preserve the Agency's safeguards system and devise ways to protect all peaceful nuclear installations, he added.--APP

CSO: 5100/4505

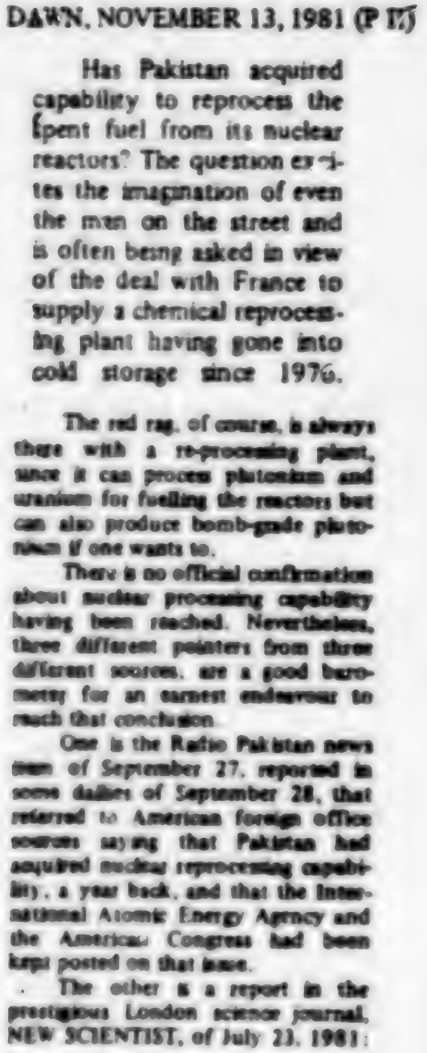
PAKISTAN

SPECULATION ABOUT COUNTRY'S NUCLEAR REPROCESSING CAPACITY RIDICULED

Karachi DAWN in English 13 Nov 81 p 2

[Article by Azim Kidwai]

[Text]



DAWN, NOVEMBER 13, 1981 (P II)

Has Pakistan acquired capability to reprocess the spent fuel from its nuclear reactors? The question excites the imagination of even the man on the street and is often being asked in view of the deal with France to supply a chemical reprocessing plant having gone into cold storage since 1976.

The red rag, of course, is always there with a re-processing plant, since it can process plutonium and uranium for fuelling the reactors but can also produce bomb-grade plutonium if one wants to.

There is no official confirmation about nuclear processing capability having been reached. Nevertheless, three different pointers from three different sources, are a good barometer for an earnest endeavour to reach that conclusion.

One is the Radio Pakistan news item of September 27, reported in some dailies of September 28, that referred to American foreign office sources saying that Pakistan had acquired nuclear reprocessing capability, a year back, and that the International Atomic Energy Agency and the American Congress had been kept posted on that issue.

The other is a report in the prestigious London science journal, NEW SCIENTIST, of July 23, 1981:

"Intelligence experts in the US believe that Pakistan has secretly built a plant for reprocessing plutonium near Rawalpindi. This plant could provide enough fissionable material for a symbolically important test explosion without waiting for the completion of the large uranium enrichment plant being built at Kahuta, some 40 KM south of Islamabad. US intelligence experts believe that this plant will not be producing bomb-grade uranium before the end of 1983.

"Observers believe the secret plant was designed to make only 10 to 20 kilogrammes of plutonium a year--enough for three bombs at the most. The plant, which, the Americans believe is in the final stages of completion, is perhaps one-tenth the size of the commercial reprocessing plant that France agreed to sell to Pakistan six years ago. France cancelled the agreement under American pressure in 1979, but the Pakistanis managed to obtain the key items from French and Canadian companies before the new project was discovered."

AAEC report

The third source is the Australian Atomic Energy Commission Annual Report for the year ending June 1980:

"Pakistan is reported to be proceeding with completion of its reprocessing plant at Chashma. A contract for construction of a French company of a plant valued at U.S. dollars 250 million was cancelled after commencement of the concrete shielding cells and associated civil works".

All the three reports, when seen against one another, seem to be tangential, at times contradicting each other. But the idea central and common to all the three is that Pakistan has reached/is on the way to reaching the capability to fabricate its own reprocessing plant.

I, for one, have never felt apologetic on that account. The reason is simple.

Belgium has a reprocessing plant at Mol, working since 1966. But has Belgium ever fabricated or exploded a nuclear bomb?

Japan has a reprocessing plant at Tokai Mura for the last so many years. Have the Japanese staged a nuclear explosion?

Re-processing of nuclear fuel should, therefore, be viewed as a sophisticated, technical capability, which any country that aspires for a sizeable nuclear programme, need have, particularly, if it believes in self-reliance. And Pakistan falls in that category.

One feels like asking the very pertinent question: Why Pakistan, that can fabricate its own fuel for KANUPP, should not have a reprocessing plant? Reprocessing of spent fuel is perhaps not such an arduous technical task as fabricating nuclear fuel for reactors.

The argument that a reprocessing plant can also yield bomb-grade plutonium if one so desires and so, is a forbidden fruit for the developing countries, is a very lousy one and hardly just or tenable. That way, one shouldn't be with a match-box. For, you can well put to fire someone else's house with a burning match-stick, if you so wish!

Writing in these columns as early as 1978 (DAWN, Dec. 1, 1978) we had argued on that point and those arguments are as valid today when Pakistan appears to be inching its way towards reprocessing capability, as we were three years back:

"But all said and done, the dilemma of over-riding importance to most nations, particularly the developing ones with little oil or coal, is that no matter how the world's energy cake is sliced for them, there is always less of it to eat every year. The tentacles of the energy hydra are a scare for them, and they are prepared to take risks, and to gamble on accounts that may even appear perilious".

"Perhaps the nuclear think-tank in Pakistan is also facing the same dilemma and is seized of the energy problem. Pakistan's motivations in not giving up reprocessing inspite of great pressures, may be the same as of many countries of Europe – to accumulate and build up an inventory of plutonium for their breeder programme, may be, 5 or 10 years hence, and also to fuel their enriched uranium reactors of the future through it."

Contradiction

The three reports from three different sources referred to earlier, are interesting because of the elements of contradiction therein.

While the American intelligence scoop times the "capability" to have been attained a year back, the Australian AEC thinks that "Pakistan is proceeding with completion of its reprocessing plant at Chashma" at that very point of time. Both appear as no more than wild guesses, as few would be led to believe that Pakistan would be working on the plant that was under a contract with France (the contract has not been annulled; it is only in abeyance).

The New Scientist story belies it any way, when it says that the plant is "one-tenth" the size of the plant contracted with France.

Supposing Pakistan is on the way to fabricating a small reprocessing plant on its own to get a feel of the reprocessing technology, why should the work be graded as something sinister. Why are not Belgium and Japan in the dock on that account?

The funny thing is that the neighbouring country, India has had two reprocessing plants – at Trombay and Tarapur – working for almost two decades. One was an imported one, the other locally fabricated. A third of 100-ton capacity is on the anvil at Kalpakkam, near Madras. What is India going to do with three re-processing plants, one may ask those who see only the red rag in a supposedly modest programme of reprocessing in Pakistan?

The bogey of uranium enrichment in Pakistan with sinister overtones has somehow gone into low key, as according to the great Delphian pundits abroad, Pakistan should have detonated a uranium "Islamic" bomb long ago – atleast a year back. The prediction has boomeranged and back-fired that way, and there is not much left in fabricating stories on the centrifuge line.

It is now the turn of a plutonium bomb through reprocessing technology!

Politics doesn't fall within the ambit of a science column, nor polemics goes along with its character. The only general remark a science columnist can, therefore make in the interest of the technological progress of the country, is that let the caravan move on and on in the nuclear field. The dogs bark in any case.

CSO: 510[illegible]505

BRIEFS

NUCLEAR RESEARCH ORGANIZATION PROTOCOL--Hanoi, 18 Nov (VNA)--A Vietnamese delegation led by Minister of Secondary Vocational and Higher Education Nguyen Dinh Tu has signed a protocol on Vietnam's participation in an agreement on the establishment of an interim international organization to coordinate research on reactor physics. The protocol was signed in Leipzig, the German Democratic Republic, during the 41st session (November 10-13) of the Permanent Commission for the Peaceful Uses of Atomic Energy of the Council for Mutual Economic Assistance. [Text] [OW190751 Hanoi VNA in English 1524 GMT 18 Nov 81]

CSO: 5100/4506

WIDER USE OF HEAT OUTPUT OF NUCLEAR POWER STATIONS PLANNED

Prague SVET HOSPODARSTVI in Czech 26 Jun 81 pp 1, 2

[Article by Eng Miroslav Cibula, SPK (State Planning Commission): "More Extensive Use of Nuclear Energy"]

[Text] In accordance with the conclusions of the 16th CPCZ Congress, by 1985 the installed power of Czechoslovak nuclear power stations is to be increased to 3,250 MW. This will make it possible for nuclear power stations to produce more than 90 percent of the total increase in electrical power generated in Czechoslovakia during the Seventh Five-Year Plan and gradually to achieve a saving of about 17 million tons of power-production-grade brown coal.

The efficiency of utilization of the heat output of nuclear power stations which use the condensation method of producing electrical energy currently is only about 30 percent, as in the case of steam boilers in conventional condensation-type power stations. Accordingly, there is considerable potential for use of this installed power other than for generating electricity. The state special-purpose program for increasing the efficiency of fuel and energy consumption is devoting special attention to converting condensation-type power stations to combined production of electrical energy and supplementary heat, which will considerably increase the upvaluation of the primary energy sources used and the effectiveness of the investments made. In condensation-type nuclear power stations, for example, there exists the possibility of supplying heat by nonregulated withdrawal from condensation-type steam turbines while assuring reliable and safe operation, at the cost of small additional investments to reconstruct the equipment. This involves the transfer of heat to centralized heat supply systems in the form of hot water by means of tertiary heat exchangers.

To organize the multiple use of nuclear power stations under Czechoslovak conditions, Energoprojekt [power facility design organization] Praha has broken down the possible types of heat supply into four categories. The first category consists of the waste heat contained in cooling water at 25° to 43°C, depending on the time of year, weather conditions and the power station's operating regime. It is proposed to use this waste heat in agricultural and foodstuff complexes for heating soil from below in greenhouses and certain open-air crop cultivation areas (thermal reclamation), for heating hothouses, for integrated nourishment of soils with hot irrigation water, for frost protection of orchards and vegetable plots, for cultivation of edible mushrooms and for warm-water raising of fish and fry.

In the second category is heat between 50° and 60° (or 80°), which can be used in temperature regulation in heated agricultural facilities. This heat may be obtained either by the heating of cooling water, using steam from unregulated withdrawals from the low-pressure sides of condensing turbines, or by cascaded use of the hot water facilities of a centralized heat-supply system with long-distance hot water loops. Depending on the economic conditions of the locality, noncycling heat supply may also be possible by making use of the total temperature drop or by building an additional recirculating system with separate withdrawal of heat from the heat-supply system. It is proposed to use heat in this category to heat greenhouses, hothouses and vegetable storehouses and semifinished products of the canning industry, as well as a source of process heat for composting, fermentation, biological purification of wastewater, heating of irrigation water and heating of auxiliary production facilities.

Waste heat and adjusted low-energy heat in the first and second categories represent the primary source of conservation in the national economy and of increased effectiveness of the investments in condensation-type power stations, additional investments in heat supply and investments in agricultural and foodstuff complexes, because this heat represents a secondary energy source with no requirement for a primary fuel source (conventional or nuclear fuel). Large quantities of this heat are concentrated in the vicinity of condensation-type nuclear power stations, and heretofore here escaped into the atmosphere as lost energy. For example, in the vicinity of some existing Czechoslovak nuclear power stations such heat amounts to 100-200 PJ per year, which is equivalent to 7-14 million tons of power-production-grade brown coal. The use of only 10 percent of this heat would represent an energy gain considerably greater than our capabilities for further expanding coal extraction. Despite the fact that the sources of this heat are localized at the sites of existing or under-construction power stations and that for the most part they can be used only in specially equipped consumption areas, our power situation requires a fundamental change of attitude toward the use of such waste heat sources. This involves primarily changes in the development concepts of potential consumers, particularly as regards the construction of crop and livestock production facilities, food industry facilities and services in areas near nuclear power station sites. This cheap heat may be effective in increasing domestic food production and may help decrease food imports from abroad, which in many cases are paid for by exporting energy-intensive heavy industry products.

The third and fourth categories of heat which could be supplied from nuclear power stations include heat intended for centralized heat supply systems at 120° to 180°C, in the form of hot water or steam, with parameters depending on needs and the distance to the consumer. The technology of heat supply from nuclear reactors in Czechoslovakia in the form of steam has not as yet been worked out. Supply of heat in the third and fourth categories from nuclear power stations would involve some decrease in the output of electrical energy, but would increase the efficiency of utilization of the installed thermal output of nuclear reactors and of nuclear fuel.

According to data from the concern Slovenske energeticke podniky [Slovak Power Production Enterprises], combined production of electrical energy and heat would increase the efficiency of utilization of the thermal output of the four

VVER 440 [440-watt water-cooled water-moderated] nuclear reactors in Jaslovske Bohunice from 31 percent to 46 percent. This would involve delivery of heat to centralized heat supply systems in Trnava, Piestany, Nove Mesto nad Vahom, Leopoldov and Hlohovec in an amount equivalent to 1.4 tons of power-production-grade brown coal. With comprehensive utilization of heat-supply capabilities in this cluster, including delivery of low-energy heat and its utilization in the municipal area, and in industry and agriculture in Trnava Okres, the effectiveness of utilization of the nuclear reactors' heat output would increase to 52-64 percent. This would mean a heat use efficiency twice as high as with purely condensation-type production.

The 22-km Jaslovske Bohunice-to-Trnava hot-water-heat supply line with a capacity of 240 MW of heat is to be built in 1983-1986. Economic evaluation of the plans for this first facility in Czechoslovakia for heat supply from a nuclear power station indicates substantially better results than for the initial planning alternative involving construction of a coal-fired heat-supply station in Trnava, although it does not take account of additional extra-economic environmental effects. In the next stage of implementation of this concept it is planned to build hot-water pipelines of the same capacity to Piestany and Nove Mesto and Vahom.

At the suggestion of FMTIR [Federal Ministry of Technical and Investment Development] and CSKAE [Czechoslovak Atomic Energy Commission], planning documentation for an experimental nuclear-heated agricultural base in Jaslovske Bohunice has already been prepared; its construction would create the conditions for judging the economic effectiveness of agricultural investments in wide-area use of low-energy heat sources from nuclear power stations.

The design proposals for the secondary circuit of the Mochovce nuclear power station in Levice Okres call for delivery of 1,020 to 1,060 MW of heat in the form of hot water at 130°/60°C, which is 2.5 times higher than the okres' estimated heat consumption for 1995.

Similar plans are being prepared for the purpose of increasing the efficient use of the heat output of nuclear power stations in the Czech Republic, namely at Dukovany in southern Moravia and at Tremelina in southern Bohemia.

Full utilization of the thermal energy available in areas where nuclear power stations are being constructed requires timely creation of suitable conditions for the withdrawal of large quantities of heat by means of construction of centralized regional systems for supplying heat to industry and the public, guidance of the construction of local fossil-fired heat sources, guidance of the development concepts of heat consumers, and suitable siting of new nuclear power stations. In addition, it is also necessary to arrange for the use of low-energy waste heat, particularly by concentrating agricultural and foodstuffs plants in the vicinity of nuclear power station sites. The economic conditions for topping th' heat would be very favorable. The problems involved are being steadily solved in the process of selection of the sites for future nuclear power stations by regional planning bodies and the investor organizations.

8480
CSO: 5100/3022

PROBLEMS IN NUCLEAR PLANT CONSTRUCTION DISCUSSED

Prague RUDE PRAVO in Czech 21 Oct 81 p 1

[Editorial: "The Most Important Construction Projects"]

[Text] By the completion of Prunerov II energy center in 1982 the era of construction of conventional steam power plants using solid fuels will come to an end in our country. This will conclude the stage of construction of energy sources which primarily use the immense deposits of brown coal in the basins under the slopes of the Ore Mountains (Krusne Hory) for production of electricity.

For the next few decades, the conventional power plants will still remain the principal producers of energy needed for our industry, transportation and households. For several decades more it will be necessary to spend considerable funds and concentrate great work effort on the exploitation of the natural wealth which still constitutes the basis of our fuel supply.

Coal is the principal source for production of electricity. We made use also of the power of our rivers. The installed output of hydroelectric power plants, however, now yields its second place in the ladder to nuclear energy which represents a long-term and, in many respects, more advantageous solution [to our energy shortage]. This has been practically borne out by the operation of the first Czechoslovak nuclear power plant at Jaslovske Bohunice.

The decision on meeting the energy needs of our economy in the future by the construction of nuclear power plants was motivated not only by the fact that the domestic deposits of solid fuels will be depleted within the next few decades, but also by the fact that the construction of additional conventional power plants would intolerably deteriorate the living environment already made bad enough both by mining activities and operation of steam power plants which still have not managed to solve the problem of desulfurization of escaping polluting fallout.

We are carrying out the grandiose plan of construction of nuclear power plants with effective cooperation and assistance of the Soviet Union which possesses long-term and invaluable experiences in their construction and manufacture of necessary equipment. For this reason, the Czechoslovak-Soviet agreement on cooperation in the construction of nuclear power plants in our country and manufacture of equipment designed for other socialist countries is of foremost importance for us.

At the present time, we are constructing the V2 nuclear power plant in the neighborhood of the already operating V1 at Jaslovske Bohunice, and the third nuclear power plant at Dukovany in southern Moravia is also under construction. The building sites are being prepared for the construction of additional nuclear power plants in southern Bohemia and southern Slovakia. It is anticipated that the nuclear power plants will produce almost 20 percent of needed electricity by the end of the Seventh Five-Year Plan and fully 33 percent by the end of the Eighth Five-Year Plan. While the power plants using solid fuels will supply the distribution grid with 75 percent of electricity in 1985, their share will decline to less than 60 percent by 1990. This reflects not only the anticipated decline in the exploitation of conventional resources, but above all the high responsibility entailed in the construction of nuclear power plants during the intervening years.

The planned development of nuclear energy and its implementation assumes extraordinary importance also by the fact that our fuel-energy balance cannot expect a further increase in the share of refined fuels, such as crude oil and natural gas, but rather a decrease due to the more effective use of these raw materials in the petrochemical industry and other chemical processes. The development of nuclear energy also represents the best way for intensified protection of the living environment in the entire state and particularly in the coal basins.

The program of construction of nuclear power plants up to 1990 is based on the program of CSSR-USSR cooperation in the area of nuclear energy up to 1990 and appropriate agreements on mutual cooperation in the design, construction and operation of individual power plants. It provides for the construction of 12 units with VVER 440 reactors and 2 units with VVER 1000 reactors, which represents an overall installed output of 7,280 MW, 3,080 MW of which should be available by 1985. The implementation of this program both in terms of the total installed output and particularly the deadlines set for putting individual capacities into operation is a very demanding task which is indispensable for the development of the national economy and therefore of utmost importance.

The past progress in the construction of nuclear power plants, however, does not correspond to our needs because we have failed to centralize, to the necessary extent, construction and assembly capacities, and to adhere to specific deadlines set for individual stages of construction. The difficulties stem from the fact that the design and preproduction preparation of construction projects is not completed on time and suffers from various shortcomings both of a construction and technological nature because the principal suppliers have not earmarked sufficient capacities for this purpose. Shortcomings appear also in the management of the actual investment process of construction.

It is true that the construction of nuclear power plants is very difficult and calls for accuracy and high quality of work. It requires a great deal of time both during the period of preparation and during the actual construction. On the other hand, however, the construction program has been well-known already for a sufficiently long time and the assigned tasks are familiar to the respective economic production units and enterprises such as sectoral enterprises Skoda Plzen, Vitkovice, First Engineering Plant in Brno, Industrial Projects Brno and others. Despite several changes in the original design, there is no excuse for the delays in the actual construction of Dukovany plant, for example. Several months' delay in putting the units into operation represents a loss in production of electricity of approximately 3 billion kilowatt hours in the last 3 years of the Seventh Five-Year Plan, which is the final analysis will necessitate the reduction of electric energy consumption and an increase both in the use of conventional power plants and coal output.

No less serious appears to be the situation in the preparation of additional capacities in southern Slovakia and southern Bohemia, which will virtually represent the only increase in the basic power plants' output during the Eighth Five-Year Plan. The delay in the preparation cannot be made up for by other power-generating capacities within the specified deadlines. If it is not compensated for by the intensification of all work, it will have extraordinarily serious consequences for the smooth supply to the national economy and households during that period.

The present situation thus requires that all levels of management of the national economy pay maximum attention to the implementation of the program of nuclear power plant construction. Nuclear power plants definitely are the most important construction project in our country and must, therefore, be given priority in all sections of the economy. It is construction which profoundly affects the overall fulfillment of the urgent tasks of our economy, although its positive effect will be noticed only after several years. It is necessary to realize particularly that any underestimation of even the smallest task now will necessarily multiply the difficulties several years later and this must be averted under any circumstances.

The construction of nuclear power plants unconditionally calls not only for making up for the delays in construction and production losses, but also for adhering strictly to the specified construction deadlines. The nuclear power plants will be the only source of increased electricity production in the future and every violation of construction schedule would have injurious consequences for the supply of electricity, which is the decisive energy obtainable from domestic resources. For this reason, all organizations participating in the construction of nuclear power plants must always bear in mind that all tasks, no matter how small, must be unconditionally fulfilled.

10510
CSO: 5100/3002

NUCLEAR FUEL CYCLE STRATEGY FOR YUGOSLAVIA EXAMINED

Belgrade ELEKTROPRIVREDA in Serbo-Croatian No 7-8, Jul-Aug 81 pp 196-205

[Article by Naim Afgan and Dusan Spasojevic, Boris Kidric Institute for Nuclear Sciences, Vinca]

[Excerpt] What Possible Strategies Are Available to Yugoslavia?

If we are to answer this question, we must introduce certain assumptions whose purpose is to help us to quantify our reflections. We will assume, that is, the following:

a. that a uniform fuel cycle will be adopted in Yugoslavia for all power plants built up to the year 2000,

b. that nuclear power plants with a total capacity of 6,000 Mw(e) will have to be built in Yugoslavia up to the year 2000,

c. that the schedule of their going on line will be such that beginning in 1990 one plant with a capacity of 1,000 Mw(e) will go on line every 2 years (Figure 4),

d. that construction of infrastructural facilities will be governed by a planning that puts them into service when the needs attain the minimal economic capacity. The plans moreover call for construction of modular units of capacity.

In the light of these assumptions and also experience in the world to date, that is, the current international conditions for the purchase, acquisition and assurance of raw materials and services to meet the needs of the nuclear fuel cycle, we have in this discussion systematized and evaluated the following possibilities:

1. Fuel Elements Acquired Abroad and Returned to the Seller When Spent (Variand 1)

This variant presupposes that a long-term contract would be signed with a potential supplier of fuel elements to furnish fuel elements according to the varying needs of each nuclear power plant. This type of arrangement is most common in the practice of the countries of the eastern bloc. This method of assuring fuel is also used when nuclear power facilities are sold to certain less developed countries for the first nuclear power plants in the country (Korea, Taiwan, Spain).

The funds that would have to be planned for the assumed schedule of construction of nuclear power plants in Yugoslavia is as follows: U.S. $\$70 \cdot 10^{6}$ in 1990; U.S. $\$104 \cdot 10^{6}$ in 1992; U.S. $\$207 \cdot 10^{6}$ in 1998; U.S. $\$241 \cdot 10^{6}$ in 2000. Figures 5 and 6 show the needs for uranium concentrate for power plants with a heavy-water and light-water reactor.

ii. The Uranium Is Furnished in the Country or Abroad, and We Have Our Own Fuel Administration for Fabrication of Fuel Elements Abroad (Variant 2)

The Krsko NE [Nuclear Power Plant] is using this method of obtaining uranium and services for processing and fabrication of fuel elements. This is predicated on the need to work out a long-term arrangement with those who have the installations necessary for processing the fuel. On the basis of the terms and conditions now in effect of the countries which possess plants for isotope enrichment of uranium, the purchasing country must assume the obligation that it will seek consent of the country selling the services for the reprocessing of spent fuel. It follows from this that enlarged capacities will have to be built for storage of the irradiated fuel at each nuclear power plant, and at the same time provision will have to be made to build separate facilities for storage of the irradiated fuel.

This variant for furnishing fuel is the usual practice in the case of reactors using natural uranium where reprocessing of the fuel is not at present necessary.

Should we decide in the coming period to commit ourselves to furnish enriched fuel in this manner for all future reactors envisaged by the schedule, then we must plan the following financial resources for uranium concentrate: U.S. $\$60 \cdot 10^{6}$ in 1991; U.S. $\$98 \cdot 10^{6}$ in 1995; U.S. $\$116 \cdot 10^{6}$ in 2000. The following resources will have to be planned for enrichment: U.S. $\$32 \cdot 10^{6}$ in 1991; U.S. $\$56 \cdot 10^{6}$ in 1995; U.S. $\$70 \cdot 10^{6}$ in 2000. The following amounts will be necessary for fabrication of fuel elements: U.S. $\$19 \cdot 10^{6}$ in 1991; U.S. $\$24 \cdot 10^{6}$ in 1995; U.S. $\$28 \cdot 10^{6}$ in 2000. The following resources will also have to be planned for the shipment and storage of fuel elements: U.S. $\$10 \cdot 10^{6}$ in 1995 and U.S. $\$19 \cdot 10^{6}$ in 2000. Here we can expect that the raw materials could be purchased domestically, while the services of fuel cycle plants would have to be obtained abroad.

The case of the nuclear fuel cycle for power plants with heavy-water reactors would require in this variant planning the following resources for raw materials: U.S. $\$34 \cdot 10^{6}$ in 1991; U.S. $\$70 \cdot 10^{6}$ in 1995; U.S. $\$100 \cdot 10^{6}$ in 2000. It would at the same time be necessary to provide the following funds for fabrication of fuel elements: U.S. $\$10 \cdot 10^{6}$ in 1991; U.S. $\$15 \cdot 10^{6}$ in 1995; U.S. $\$20 \cdot 10^{6}$ in 2000.

Raw materials might also be obtained in the country for reactors with enriched uranium, while the fuel elements would be fabricated abroad.

It follows that about 58 percent of all the resources needed for the fuel cycle with enriched uranium might be obtained within the country, while for the fuel cycle with natural uranium this amount would be about 75 percent, not counting the heavy water.

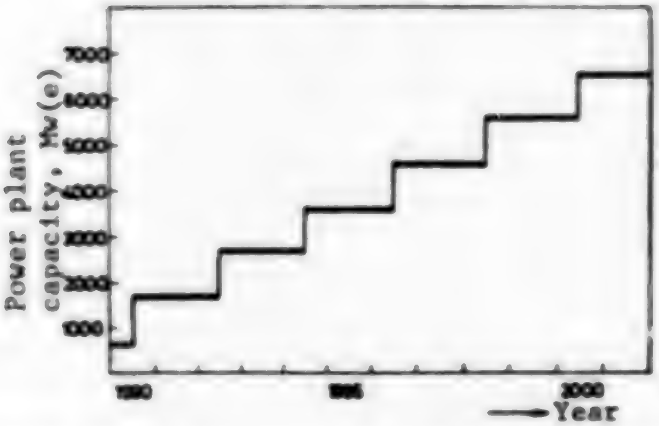


Figure 4. The scenario under consideration for construction of nuclear power plants in Yugoslavia.

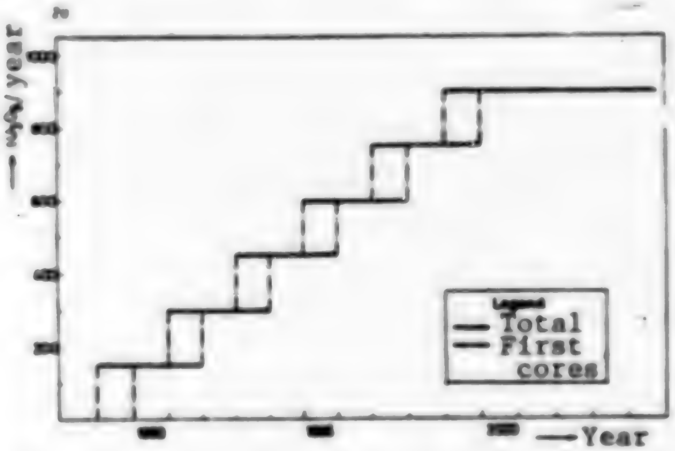


Figure 5. Uranium concentrate needs for power plants with heavy-water reactors.

iii. Uranium Obtained Within the Country or Abroad, Isotope Enrichment Abroad and Fabrication and Stockpiling of Fuel Elements Within the Country (Variant 3)

This variant is based on the assumption that at some point in time we will commence construction of the infrastructural facilities of the fuel cycle. Since the technology for fabrication of fuel elements is commercially available even today, the only question that arises is when our needs will reach the threshold of an economically suitable capacity. As concerns the fuel cycle, this variant has no difference except the limitation on the reprocessing of spent fuel, which will continue to exist for enriched uranium fuels, if the uranium is enriched abroad.

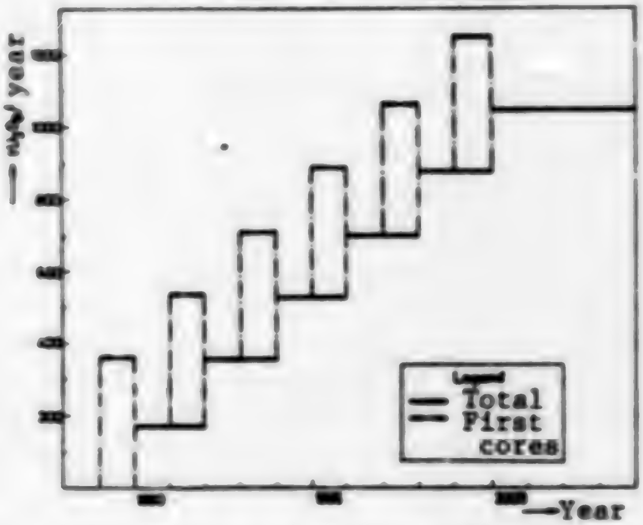


Figure 6. Uranium concentrate needs for power plants with light-water reactors.

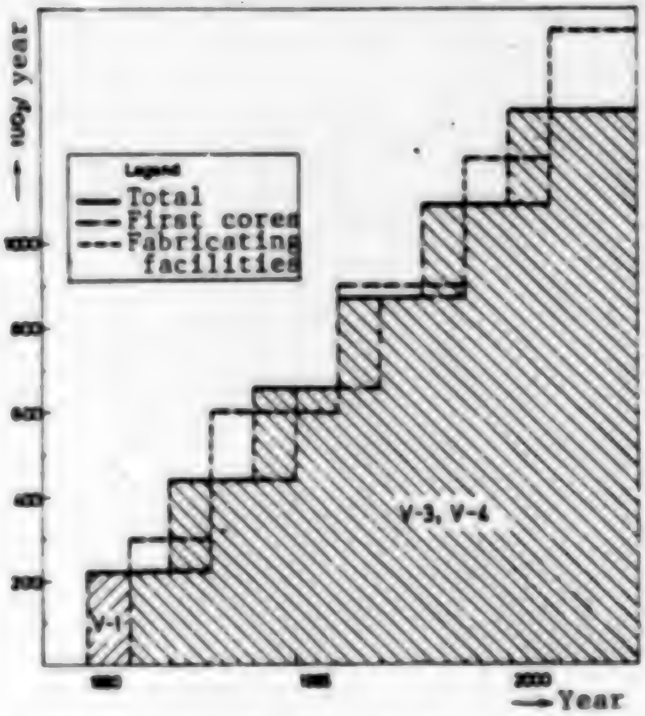


Figure 7. Obtaining fuel elements for power plants with heavy-water reactors.

Figures 7 and 8 show the needs for fuel elements for power plants with heavy-water and light-water reactors.

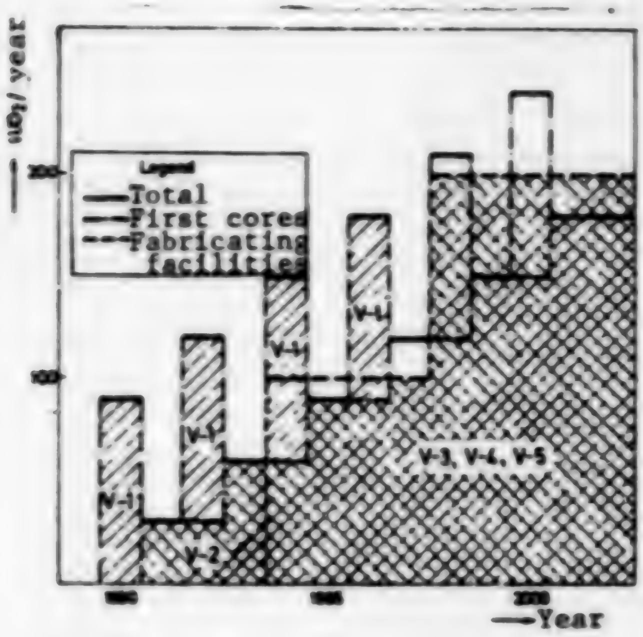


Figure 8. Obtaining fuel elements for power plants with light-water reactors.

The calculation is based on modular construction of the plant for enriched fuel elements, and a capacity of 100 tons per year would be in production in late 1993, while the next 100 tons per year would go into production in 1998. It is assumed here that the first cores for the first three power plants would have to be purchased abroad along with the appropriate number of changes until the first phase of the fabrication plant goes into operation.

Modular construction of the plant can also be assumed for production of natural uranium fuel elements. The first module of 200 tons of output per year would have to go into production by late 1990, and a capacity of 200 tons per year would be added every 2 or 3 years thereafter, so that at the end of the next decade a capacity of about 1,000 tons per year would be in operation.

Again in this version power plants with reactors for isotope-enriched uranium would require that provision be made for long-term storage of fuel elements so that in the case of natural uranium fuel elements it would be possible by 1993 to build a fuel reprocessing plant justifying modular construction with output increments of 300 tons per year.

The costs of raw materials in the fuel cycle for enriched fuel would be the same as for Variant 2. Much the same is true of the costs of enrichment services and production of heavy water. Construction of our own plants for fuel production make it possible for a portion of the costs of fabricating the fuel element to be incurred within the country for both enriched and natural fuel.

iv. Uranium Obtained Within the Country or Abroad, Isotope Enrichment Abroad, But Domestic Fabrication of Fuel Elements, Fuel Reprocessing and Fabrication of Fuel Elements on the Basis of MOX Fuel and the Treatment of RAO [radioactive waste] Within the Country (Variant 4)

This variant assumes that the fuel must be enriched abroad, but at the same time there are no obstacles to reprocessing the fuel and fabricating fuel elements on the basis of plutonium. In the case of natural uranium, this variant offers the possibility of becoming completely independent.

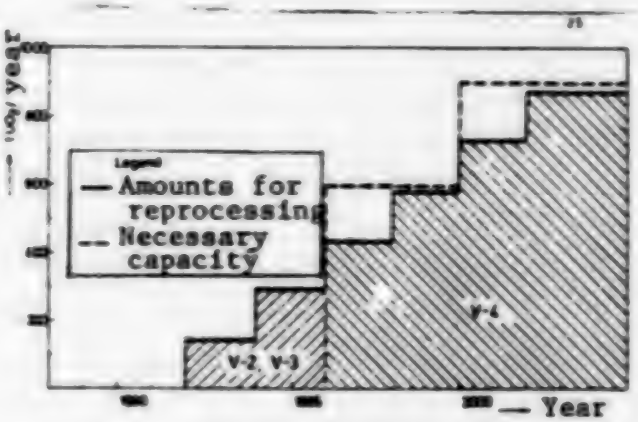


Figure 9. Reprocessing of irradiated fuel from power plants with heavy-water reactors.

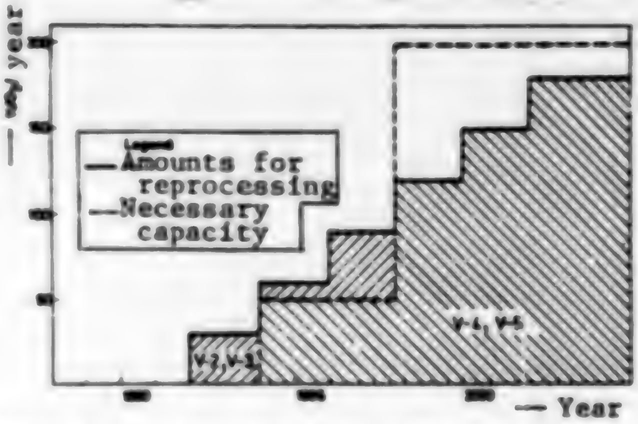


Figure 10. Reprocessing of irradiated fuel from power plants with light-water reactors.

Figures 9 and 10 show the amounts of fuel arriving for reprocessing from power plants with heavy-water and light-water reactors.

The fuel cycle with enriched uranium requires in this variant that fuel reprocessing begin as early as 1995 with a plant whose output is 50 tons per year, and then in 1998 a plant would be put into operation with another 150 tons per year. The assumption here is that the plant with an output of 50 tons per year would be an industrial-scale pilot operation.

For the natural uranium fuel cycle plans called for building a modular type of fuel reprocessing plant as follows: the first capacity of 300 tons per year would go into operation in 1995, and a plant with an output of 300 tons per year would go into operation every 3 years thereafter. It should be stated in this connection that the simplicity of storing the natural uranium fuel elements and the considerably lower value of raw materials contained in them provides for greater flexibility in scheduling the opening of fuel reprocessing plants.

We need to emphasize here that along with the fuel reprocessing plants, there is a need to make provision for the appropriate capacity of an installation for storage and treatment of RAO.

Fuel reprocessing would create the conditions necessary for production of fuels on the basis of plutonium. Their use in thermal reactors makes it possible to reduce consumption of natural uranium by about 25 percent, and this would at the same time diminish the need for isotope enrichment of fuel. Though the economic side of the production of this type of fuel is still uncertain, we can confidently expect that in the coming period substantial use will be made of this fuel, especially in countries which do not expect to introduce fast ones at an early date.

v. Obtaining the Uranium and Accomplishing All Phases of the Fuel Cycle Within the Country (Variant 5)

It is the goal of every country planning introduction of nuclear power to possess the necessary amounts of uranium and corresponding plants for processing and reprocessing the nuclear fuel. In our situation and for the assumed program based on the scenario we have presented, this can be done only in 1998, while for reactors with natural uranium these conditions will be fulfilled in 1995. It is assumed here that the fuel reprocessing plant is the limitation. It follows that this variant for uranium reprocessing does not differ from Variant 4. With respect to the enriched uranium fuel cycle this means that it would be necessary to commence operation of our own plant with a capacity of $0.5 \cdot 10^6$ JSR/year in 1992, and the plans would call for building the second part of that plant, with a capacity of another $0.5 \cdot 10^6$ JSR/year, by 1998 (Figure 11). This makes it possible to add to this plant new modules whose capacity would be in line with the projected program. It follows that for the first three power plants in the assumed program it will be necessary to lease capacities for isotope enrichment of the fuel abroad. It will also be necessary to provide isotope enrichment for replacements for power plants which will be built before the isotope enrichment plant is put into operation. For the other installations of the fuel cycle this variant corresponds to the requirements set forth for Variant 4.

What Commitments Determine the Nuclear Fuel Cycle Strategy?

Before answering this question we need to examine on the basis of the scenario that has been adopted for nuclear power plant construction which commitments are indispensable to the possibilities examined for furnishing nuclear fuel.

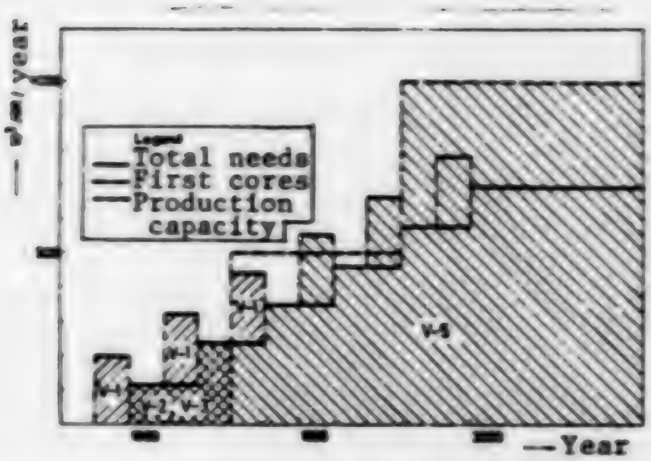


Figure 11. Isotope enrichment of uranium for power plants with light-water reactors.

Certainly the first commitment is related to furnishing raw materials. And, as we see, for the scenario that has been selected, whether we are talking about the heavy-water type or light-water type of reactor, the amounts of uranium concentrate needed are such as to require that this job begin as soon as possible and be conducted on a scale which will afford us the possibility of satisfying our future needs. In this connection a clear commitment should be made to purchasing uranium from all available sources which do not impose additional conditions. However, over the long run the commitment should be made above all to domestic sources and to sources in developing countries where we might sell our technology. A commitment also needs to be made in line with the needs to the development and adoption of a technology for processing the ore and also for converting it into a suitable form for fabrication of fuel elements. Considerable attention must be paid to secondary raw materials, especially to adoption of a common technology. The present lack of known uranium reserves makes it necessary that we orient ourselves toward mastering those technologies which will make it possible for us to furnish the largest possible amounts of uranium from the plants and raw materials which we possess in the country.

The second commitment which does not depend on the choice of the nuclear fuel cycle is that we build jointly in the country those fuel cycle plants for which there exist in the world available technologies which can be purchased without additional restrictions. The capacity of these plants and the timing of their construction is to be determined according to the needs of our joint program for nuclear plant construction. This group would include above all a plant for fabrication of fuel elements. For the scenario of nuclear power plant construction we are analyzing, it is possible to determine the capacity and construction schedule of these plants regardless of whether we are talking about natural or enriched uranium fuel.

The third commitment which does not depend on choice of the conception of the reactor system is the need to undertake development of a long-range conception and development of technology for processing, treatment and storage of radioactive waste. It is well known that RAO can be divided into two groups, as follows: RAO from nuclear power plants and RAO from fuel reprocessing. We will encounter the first group of RAO when the nuclear installations commence operation, while the second group will be the object of our attention only when the fuel reprocessing plant goes into operation. However, this offers us an opportunity through our involvement with the first group of RAO to master the techniques and technologies which we will need in treating, processing and storing the RAO coming from the fuel reprocessing installations.

The second group of commitments are those which are directly related to selection of the fuel cycle strategy. The first commitment in this group is this: whether or not to commence reprocessing of the spent fuel, and when. It follows that according to the scenario selected, the reprocessing of irradiated fuel could begin in 1995--and in 1993 for heavy-water reactors. However, if we take into account the schedule for construction of these facilities as a necessity if through our own development we are to master technologies for reprocessing spent fuel, then it is realistic to assume that these projects are optimistic and that shifting them 5 years provides a more realistic variant of the scenario. However, it should be emphasized in this connection that regardless of when construction of these plants needs to begin, our commitment to the desire to reprocess the fuel must be evident even today, since only in this way can we ensure that we can count on construction of these plants when that becomes feasible.

The key question in selection of the fuel cycle with natural uranium or the one with isotope-enriched uranium is related to the process of isotope enrichment of uranium and heavy water. It is evident from the scenario we have been examining that the first phase of the enrichment plant would have to be in operation as early as 1993, while heavy water production should commence as early as 1989. This commitment has considerably broader dimensions than the schedule for construction of these plants, and therefore we wish to present certain questions which can have a bearing on the commitment in this area.

The processes of heavy water production are considerably more simple and considerably smaller in capacity than the corresponding plants for enrichment, assuming the same scenario for construction of nuclear power plants. This offers the possibility of mastering those technologies of the nuclear fuel cycle more rapidly and of building the appropriate plants. If we add to this the somewhat smaller requirement for uranium raw materials, then it is certain that this strategy is more suitable to countries with a rather scanty economic potential, countries which moreover want to emancipate themselves in the shortest possible time.

Enriched fuel opens up far broader opportunities for application of differing design features in reactor construction. Opportunities are created thereby for choosing several partners for potential collaboration, since it is possible to adjust the fabrication of fuel elements to each individual reactor, which is in fact done in practice. It follows that this choice would be more suitable from the standpoint of potential polyvalence and broader linkage with various partners.

We would like in conclusion to emphasize that the fuel cycle, regardless of the scenario chosen for construction of nuclear power plants, will depend less and less on the available raw materials and more and more will be related to possession of the appropriate knowledge about technologies for processing them. Let us be permitted, then, to quote in conclusion the words which Comrade Tito uttered in a wartime conversation: "that the important thing in life is to decide, since things in life become most difficult when no decision is made."

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7045
CSO: 5100/3003

BRAZIL

MORE ENRICHED URANIUM TO BE PURCHASED FROM URENCO

Rotterdam NRC HANDELSBLAD in Dutch 13 Oct 81 pp 1, 11

[Report by Roel Janssen]

[Text] According to political sources in Brazil, the Brazilians have definitively decided on enriched uranium for their atomic powerplants from the West European consortium URENCO [Uranium Enrichment Co], of which the Netherlands is a member. Brazil is said not to expect enriched urnaium from the United States because the Brazilians do not want to submit to the security demands which the Americans tie to deliveries.

Brazil does not want to designate the URENCO uranium solely for the Angra II and III atomic powerplants as originally intended, but for the Angra I powerplant as well. This powerplant, built by the American firm Westinghouse, is to begin operations at the end of this year.

On the basis of an agreement between the United States and Brazil concluded in 1972, Angra I was to be fueled with American enriched uranium. The first shipment was received by Brazil in 1979, but after that the United States registered objections to further deliveries on the basis of the Nuclear Nonproliferation Treaty ratified in 1978. The Americans want Brazil to accept so-called "full-scope safeguards," which is to say that Brazil would have to submit all of its nuclear activities to international control.

For reasons of principle, Brazil wants only to accept complete security requirements with each nuclear agreement, but refuses to subject itself in advance to total control.

Because of this the United States-Brazilian negoitations about further deliveries of enriched uranium reached an impasse. The Brazilians feel that the United States is legally obligated to honor the 1972 agreement, which after all antidates the 1978 Nuclear Nonproliferation Treaty.

During his visit to Brazil last month the U.S. undersecretary of state for Latin American affairs, Thomas Enders, promised that the United States wants to become a reliable partner to Brazil again in the area of atomic energy. Apparently the Brazilians did not place much reliance in that, and have sought contacts with URENCO in the meantime, with which an agreement was concluded in 1978 to provide the atomic powerplants Angra I and II--built in accordance with the Brazilian-FRG nuclear treaty--with enriched uranium.

In political circles in Brazilia the chances of reaching agreement even now with the United States are regarded as minimal. According to Cesar Cals, the Brazilian minister for mining and energy, the enriched uranium which had originally been designated for the Angra II powerplant, which will not enter service on time, will be accepted normally on time and used for Angra I.

A URENCO spokesman in Almelo confirmed that the first deliveries of enriched uranium to Brazil will begin at the end of this year. According to him, however, that has nothing to do with the possible noncontinuation of American deliveries. Furthermore, according to the contract with URENCO, the Brazilians are entirely free to use the fuel rods for a different powerplant than the one for which they were originally intended.

In Brazil it is assumed--in view of the fact that there is now one more reactor to be fueled--that the total amount or enriched uranium which Brazil is going to obtain from URENCO will also be increased. The Dutch URENCO spokesman said that the conclusion was entirely on the part of the Brazilians. He denied that there had already been contacts with Brazil concerning expansion of the deliveries. He added that if Brazil were to decide on balance to build one less atomic powerplant, such an expansion would be entirely unnecessary.

URENCO and Brazil

According to diplomatic sources in Brazilia, the Dutch parliament need not issue a definitive export permit for the deliveries which are to take place shortly, as was promised by the Van Agt government during the heated debates on this question in 1978. In fact, URENCO decided that the uranium for Brazil will not come from the Almelo enrichment plant, but from the one in the English city of Capenhurst.

Even so, the conditions for the deliveries which were set in 1978 remain in force. These conditions state that an attempt will be made to establish a storage regime within the framework of the IAEA (International Atomic Energy Agency) for the plutonium which will be eventually be produced in the processing of the expended enriched uranium. If, 2 years before that processing, no IAEA storage regime has yet been instituted, the three URENCO countries (England, Germany [FRG], the Netherlands) and Brazil are to establish a separate "ad hoc" storage regime together.

This question, however, has lost its urgency because Brazil has fallen several years behind in the execution of its nuclear program. The construction of the processing plant has been postponed indefinitely, although work is being done on a pilot plant for processing [nuclear wastes] on a laboratory scale. For that matter, diplomatic observers in Brazil point out that Brazil has continuously demonstrated its political desire to reach a settlement within the framework of the IAEA. The chairman of the IAEA commission working on a plutonium storage regime is himself a Brazilian diplomat.

6940
CSO: 5100/2019

BRIEFS

NUCLEAR ENERGY AGREEMENT--Cuba's Atomic Energy Commission and Bulgaria's Committee for the Peaceful Use of Atomic Energy have signed a bilateral cooperation agreement for the next 5-year period. The two sides viwed the document as very important for the future development of nuclear energy for peaceful ends in Cuba and Bulgaria. [Text] [FL210151 Havana Domestic Service in Spanish 0000 GMT 21 Nov 81]

CSO: 3010/332

CANADA TO PROVIDE NUCLEAR TECHNOLOGY IN 1982

Mexico City EL DIA in Spanish 5 Nov 81 p 8

[Text] During a press conference, the vice president for research of Atomic Energy of Canada, S.R. Haecher, remarked that a complete transfer of both reactor and heavy water technology would be made by Canada to Mexico in the bid to be submitted at the beginning of next year for the construction of a nuclear electric plant in Laguna Verde.

Yesterday, Dr Haecher participated in the seminar on the fuel cycle for the CANDU reactors being offered by Atomic Energy of Canada (AECL) to Mexican technicians.

The function was opened by the director of URAMEX, Francisco Vizcaino Murray, who thanked the Canadians for the enthusiasm that they have been showing for backing our country's nuclear program.

Moreover, Dr Haecher explained that the proposal that they would submit will involve the natural type of uranium, the plan for which was developed in his country to use the uranium and not depend on other countries for enrichment.

He also noted that the handling of fuel in the CANDU reactors is very simple, and it is unnecessary to stop and make a change in elements; adding in this regard that many of the components for the handling could be manufactured here.

The reactors being sold by Canada are for 500 and 850 megawatts, and the former, which are built in a period of 5 years, cost approximately $1.2 million.

He also observed that the only condition imposed by the Canadian Government on those interested in their reactors is that an independent commission of the International Atomic Energy Organization assume responsibility for seeing to it that the radioactive waste is not used for military purposes; because it is known that the fuel emerging from the CANDU reactors contains plutonium, which is generally used to manufacture the atomic bomb.

In conclusion, Dr Haecher said that the waste from their nuclear powerplants is stored in tanks located in the facilities themselves, so that a decision may be made later on a more suitable use thereof.

2909
CSO: 5100/2035

ENRICHED OR NATURAL URANIUM DECISION STILL PENDING

Mexico City EL DIA in Spanish 5 Nov 81 p 8

[Text] Upon being interviewed, Dr Carlos Graeff Fernandez, manager of the fuel cycle for Mexican Uranium, claimed that Mexico's nuclear program depends on a policy decision that has not yet been made, consisting specifically of an announcement of the line that the country will pursue in this respect, which could be natural or enriched uranium.

He also said that a program of this scope entails technical implications, because both kinds of technology have their advantages and disadvantages.

In response to a question as to whether this type of program should be put to the citizens for a decision, Graeff Fernandez emphasized that he did not agree, owing to its technical and political aspects.

Moreover, he stated that the decision to build the second nuclear electric plant in Mexico to fulfill the stipulations in the national energy program was already made at the time when authorization was given to open the bidding. What will be decided by the middle of next year, after an analysis of the bids from the seven participating companies, is what the country will construct. However, he disclosed the possibility that it might be two companies to which the contract would be granted.

Graeff Fernandez also noted that nuclear power could not meet the population's demand for electric power by the year 2000. It will contribute only a quarter, and the rest will be generated by conventional methods.

On another topic, Dr Graeff Fernandez said that the American bid to build nuclear powerplants in exchange for oil is good; however, Mexico realizes that, for its nuclear development, it requires a transfer of technology, so that our industry can participate in making some of the components.

In commenting on Laguna Verde, Dr Graeff said that the delay has not been due to obstacles posed by the American government, but rather to changes of policy.

Finally, he commented that the advantage of Mexico's deciding on its nuclear development with the two types of technology would be that it would not rely on a single supplier, which would afford us a broad margin for negotiation.

2909
CSO: 5100/2035

COUNTRY'S NUCLEAR PLANS EXAMINED

London 8 DAYS in English No 44, 7 Nov 81 pp 54-55

[Text] Though negotiations on the price of LNG will be at the heart of discussions during President Francois Mitterrand's state visit to Algiers at the end of November, the French will also seek to discuss Algeria's nuclear power plans.

Algeria's economic planners are seeking to diversify the country's energy supplies and officials at the ministry of heavy industry say that nuclear power could provide up to ten per cent of the country's electricity requirements by the end of the century.

Technicatome, a subsidiary of the French atomic energy commission, is to supply Algeria with a small experimental nuclear reactor, to be installed at the new nuclear research centre planned for Ain Dussera. Another French company, Sofratome, is carrying out a feasibility study for the construction of a 600MW pressurised water reactor. French diplomatic sources in Algiers told 8 Days that they expected the survey to be positive.

France, however, is not alone in seeking to provide Algeria with nuclear technology. At September's Algiers trade fair, Nicolai Rybakov, commercial officer at the Soviet embassy, announced that talks were to start between officials of the two countries on cooperation in nuclear energy. However, diplomats in the Algerian capital doubt whether, for political reasons, the President Chadli Benjedid government would choose the Soviets to build a nuclear power plant in the country.

The chances of other industrialised nations are probably better. Already, Britain, Canada, the US, West Germany and Belgium have expressed interest in the Algerian market for nuclear reactors. Algerian Minister of Finance Mohammed Hadj Yala even suggested to Brazilian Minister of Mines and Energy Cesar Cals last summer, that a form of South-South nuclear cooperation be organised between their respective states.

Nonetheless, Paris is by far the best placed to participate in the Algerian nuclear energy programme. France is one of the world leaders in nuclear technology and--nuclear power being a highly sensitive question--the Algerians would only sign a deal with a politically reliable partner.

Since Mitterrand came to power last May, the often-troubled relations between Paris and Algiers have significantly improved. The French head of state's trip to Algeria will seal the Franco-Algerian rapprochement and lay the foundation for long-term industrial cooperation, with nuclear energy being given a high priority.

Algeria has yet to sign the nuclear Non-Proliferation Treaty. Diplomatic sources in Algiers suggested to 8 Days that once the go ahead is given for the building of a nuclear power plant, the government could sign the treaty without much delay.

Algeria's considerable uranium resources in its Saharan provinces is also a major plus for its nuclear programme.

The state mining company, Sonarem, is intensifying its uranium mining programme. Work has already begun on the infrastructure for a new mine in the remote Hoggar mountain region, some 300km east of Tamanrasset. Production should begin in 1984, with capacity rising to between 1,000 and 1,200 tonnes by 1986, placing Algeria in the league of medium-size uranium producers like Gabon.

CSO: 5100/5002

MOROCCO

NUCLEAR ENERGY PRODUCTION NOTED

Rabat L'OPINION in French 10 Oct 81 p 3

[Article: "Morocco Will Produce 280 Tons of Uranium Oxide Annually after 1984"]

[Text] Morocco will produce 280 tons of uranium oxide each year after 1984 and 2000 tons a year by the year 2000. This is what Ambassador Ali Skalli, the permanent representative of Morocco in Geneva, announced before the General Congress of the International Atomic Energy Agency (IAEA), recently held in Vienna. Skalli also announced that four 600-megawatt power stations will be put into service gradually after 1993.

As far as development of research and production of solid energy resources is concerned, "Morocco is giving particular attention to the uranium contained in phosphates or in deposits," Skalli declared before IAEA. In fact, the prospecting work which has been accomplished up to the present in the field has made it possible to detect promising zones, especially in Haute-Mouloya and the Imin Tanout area.

As for the uranium to be extracted from phosphoric acid, given that recovery techniques have reached a stage of industrial maturity, it was decided to construct a first extraction plant in Safi. This plant, which will go into production as early as 1984, will have a production of 280 tons of uranium oxide per annum.

The program will be pursued in connection with the construction of phosphoric acid production plants, and production of about 2000 tons of uranium oxide per year is expected to be reached. Morocco, which has at its command phosphoric acid production plants which are among the largest in the world, will thus be in a position to be the leading producer of the uranium contained in phosphates.

Morocco has also developed an electronuclear program in order to meet basic energy needs. Considering the evolution of power required on the national network, a first nuclear plant with an output of 600 megawatts could be operational toward 1993.

Assuming acceleration of the electronuclear program, the nuclear program envisaged up to the year 2000 will require gradually placing four 600-megawatt sections into service, starting in 1993. Given the time necessary to build a nuclear power plant (approximately 12 to 13 years), Morocco has already begun preliminary studies relating to site selection and the training of qualified personnel with the help of the IAEA, among others. The site selection study itself will be launched this year.

9380
CSO: 5100/5000

FAULTY EMERGENCY COOLING SYSTEM OF SOVIET-MADE REACTOR CAUSES CONCERN

Helsinki HELSINGIN SANOMAT in Finnish 28 Oct 81 p 17

[Text] Loviisa (HS) In its most recent report, the radiation safety institute, STL, draws attention to flaws that have been detected in the Loviisa 2 high pressure emergency cooling system.

The system has shown unusually many faults in the sealings, in the control of the emergency cooling pumps and in the transmission of electricity. Because of these imperfections in the equipment, further investigation will be conducted into the system. The faults also have forced a reevaluation of the technical and safety regulations concerning the operational conditions.

According to the report, the first half of 1981 was otherwise satisfactory at the Loviisa power plants, if the utilization factor is used as the measure.

Loviisa 1 produced electricity continuously until the maintenance break in late June. The utilization factor at Loviisa 2 became lower as a fire occurred in late June in the brush gear of a generator; this caused the power plant to operate only at half-capacity.

The utilization factor at Loviisa 1 was 0.935 in the first part of the year, and at Loviisa 2, 0.809. In Olkiluoto, TVO 1's utilization factor was 0.732 and that of the TVO 2, 0.398. Rotor faults were the biggest cause of trouble in Olkiluoto.

The most peculiar fault occurred in the TVO 1 nuclear power plant, where the person in charge of computing the amount of leakage in the valves got minutes and seconds mixed up with each other. As he computed the tightness of the insulation valves, he used wrong markings, and the computation error became 60-fold. When the mistake was detected, the amount of leakage was recomputed. In some of the valves, leakage was found to be greater than allowed.

The leaks of the valves in the containment building are significant in a serious emergency situation, because it is possible that radioactive matter might leak through them to the environment. However, the valves that were now leaking could not alone be responsible for the volume of leakage since there were also tight valves among them.

9571
CSO: 5100/2028

FRANCE

ERRATUM: NATION'S URANIUM FUEL SUPPLY STRATEGY DISCUSSED

[Editorial Report] Paris CEA NOTES D'INFORMATION in French on page 11 of its September 1981 issue carries a corrected version of a chart which originally appeared on page 17 of the journal's June 1981 issue. The original version of the chart was published in JPRS 79059 of 24 September 1981, No 116 of this series, page 35. The corrected chart is printed below.

France: Known Uranium Resources

10^3 t U	R.A.R. [1]	R.S.E. [2]	TOTAL
< 80 $/kg U	39.60 59,30	26,20 26,40	65,80 74,85
80-130 $/kg U	15,70 15,550	19,65 18,050	35,35 46,45
TOTAL	55.30 87,70	45,85 33,60	101,15 121,30

– 1979
– 1981 ◩ △ = 20,15 10^3 t U

1. Reasonably certain resources
2. Estimated supplemental reserves

9679
CSO: 5100/2313

SWEDEN

NUCLEAR AGENCY PROPOSES UNDERWATER STORAGE OF WASTES

Stockholm DAGENS NYHETER in Swedish 17 Sep 81 p 1, 12

[Article by Peter Sandberg]

[Text] At the beginning of next year SKBF (the Swedish Nuclear Fuel Supply Company) will apply for a permit to construct a final storage facility for reactor waste. According to the plans, it would lie 50 meters beneath the bottom of the sea off the coast of Forsmark and it would be put into use in 1988. It is estimated that it would cost about 1 billion kronor.

The facility is not intended for storage of spent fuel, but contaminated material from filters, materials that have been kept in a radioactive environment, etc. Such waste is classified as low and medium level waste and it is considered to be safe after about 500 years.

This waste is presently sealed in canisters or concrete containers at the various nuclear power plants. By the end of the eighties no more room will be available for it and a central storage place or expanded local storage places at the power plants will be needed.

Barseback will expand its storage space in the next few years, since its present areas are almost full.

SKBF's work on final storage of this waste was presented at a Nordic reactor waste conference in Kungalv on Wednesday.

"Many requirements had to be met. It must be near a nuclear power plant, have little groundwater flow, lie in rock, and be able to be back-filled and abandoned when it is full," civil engineer Gerold Lange of SKBF said.

Special Ships

It was decided that Forsmark was most suitable and the bedrock off the coast was examined. The area chosen must lie at least 6 m under the surface of the sea so that after 1,000 years of land elevation it would not protrude above the surface of the water. The repository itself should lie 50 m below the bottom of the sea.

The waste, which is sealed in asphalt or cement at the power plants, would be taken by special ships to Forsmark. There it would be hauled through a 1,400 m tunnel down to the repository.

The latter would consist of four large tanks embedded in clay, a tunnel system, and two mined areas for low-level waste. The tanks would be divided into shafts in which canisters and concrete containers would be lowered and sealed over with concrete one by one.

When the nuclear power program is over and the power plants dismantled sometime around the year 2020, the repository would be sealed, the tunnel filled with broken rock, the pump turned off, the building at the tunnel entrace torn down, and the natural environment restored.

Veto Right

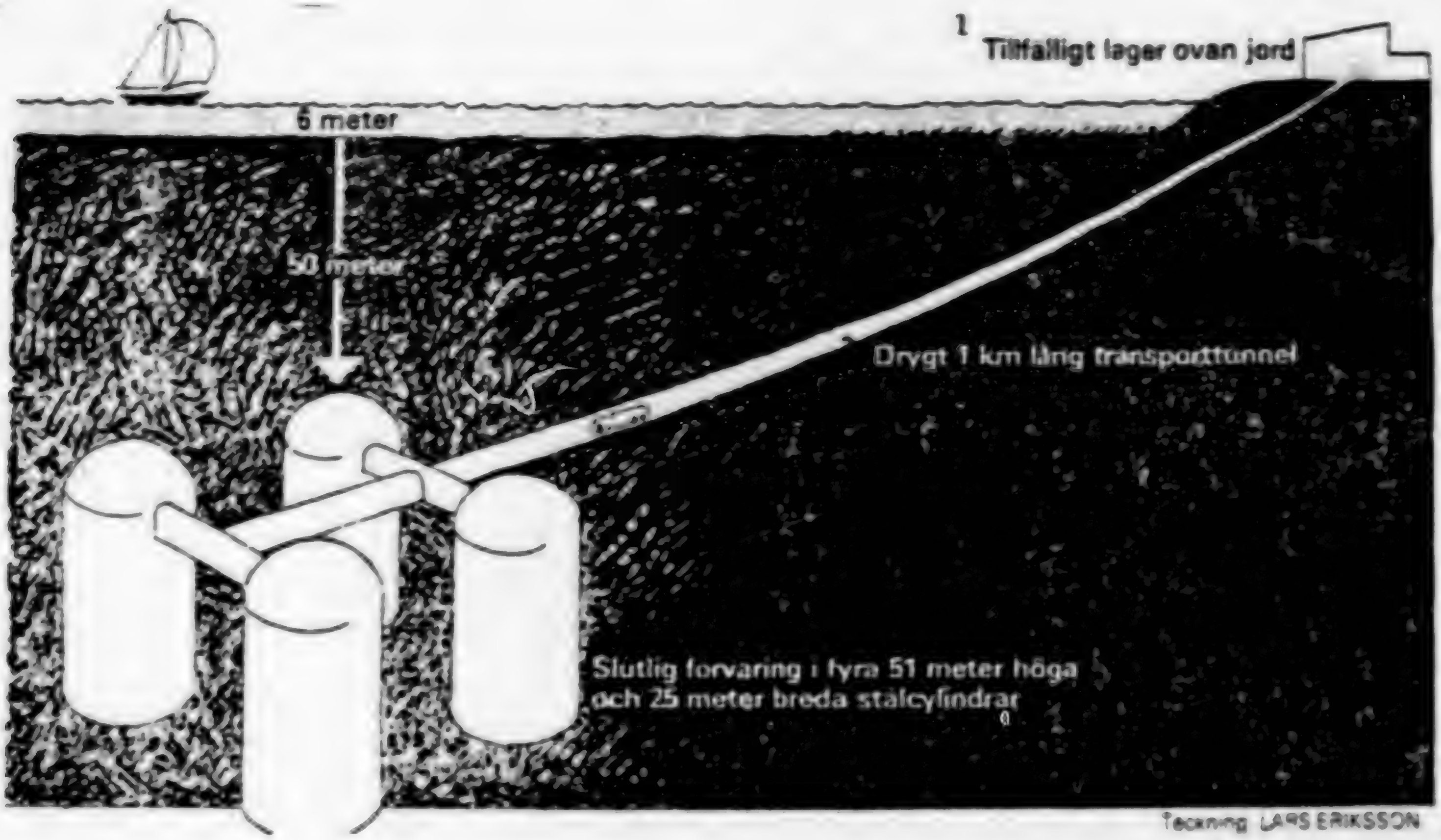
About 100,000 cubic meters of reactor waste will have been produced when the 12 nuclear reactors are shut down in 24 years.

"This structure has a very good margin of safety and, for this reason, quality requirements need not be especially high," Gerold Lange said.

The application will be presented next spring. It will be dealt with according to paragraph 136.a of the building code, which means that the municipality of Osthammar has a veto right.

SKBF estimates that the authorities will take 1 year to deal with the matter, construction will start in 1983, and operation will begin in 1988.

SKBF anticipates no problems in obtaining the approval of the municipality.


1
Tillfälligt lager ovan jord
6 meter
50 meter
Drygt 1 km lång transporttunnel
Slutlig förvaring i fyra 51 meter höga och 25 meter breda stålcylindrar

Teckning: LARS ERIKSSON

Key:

1. Temporary storage above ground
2. Transport tunnel, just over 1 km
3. Final storage in four 51 m high and 25 m wide steel tanks

9336
CSO: 5100/2025

FIRM DECIDES AGAINST MINING URANIUM IN PLEUTAJOKK

Stockholm DAGENS NYHETER in Swedish 17 Sep 81 p 12

[Article by Bo G. Andersson]

[Text] Reaction in Arjeplog was mixed Wednesday when it was announced that there would be no uranium mine in Pleutajokk. Opponents of nuclear power rejoiced, understandably enough, while the Social Democrats and Liberal Party officials could not hide their disappointment over the lost jobs and the way LKAB [the LKAB Mining Company] treated the community.

"It is extremely painful to lose 200 jobs and the future of this municipality seems quite bleak," said Kurt Burman, secretary of the Social Democratic Association and member of the municipal council.

"We have worked hard for years to open a mine and have assumed that LKAB's information on the amount of ore was correct."

"Now that the Swedish Nuclear Fuel Supply Company maintains that the quantity is not sufficient for an economically viable mine, we are astounded to say the least. In a way, we have been misled, deliberately or otherwise," Burman said.

Arjeplog is a typical sparsely settled municipality in Norrland. During the past 20 years the population has decreased by 50 to 100 people per year. Since 1959 one third of the people have moved away.

In Need

For this reason, reports in the early seventies of uranium finds in Pleutajokk promised salvation for the community in its time of need. The dream of an inexhaustible source of uranium was present from the beginning. "Here is our new uranium center," DAGENS NYHETER wrote in November 1973.

The expectations did not diminish with the years and in 1976 LKAB took over the study from SGU (Geological Survey of Sweden). An agreement was reached 2 years later between LKAB and the nuclear power company SKBF (Swedish Nuclear Fuel Supply Company).

In December 1980 LKAB believed it had found enough uranium ore to apply for a mining permit from the government.

Even then, however, there were many critical voices within LKAB warning against the project, including Tibor Parak, director of LKAB's prospecting company. Parak was dismissed for his opposing views in this matter, among other reasons.

The critics pointed out that the uranium ore was found in narrow bands in the mountains and for this reason it would be expensive to mine. They also believed that radiation protection had not been sufficient during the exploration in 1980. The matter went so far within the prospecting company that an internal protest was made against LKAB executives. Environmental considerations would also be too expensive to the company, it was stated.

At the time, LKAB officials did not wish to acknowledge openly the internal reaction.

"Today the Pleutajokk deposits are well enough known that mining can proceed during the period nuclear power will be used in this country (25 years, DAGENS NYHETER's note)," vice-president Anders Erlandsson said as recently as March of this year.

In April the municipal council of Arjeplog voted by a one-vote majority to approve the project.

Reconciled

SKBF, which was LKAB's only customer, remained rather cautious throughout. Only several days after Erlandsson's optimistic statement, the company demanded new drillings to find out more about the uranium ore.

On Wednesday SKBF finally announced that it could not remain in the project because the quantities of ore were not sufficiently large. There was enough only for 5 to 6 years of mining, it was now said.

The idea of uranium mining, however, is by no means forgotten in this country. For several years SKBF has been conducting a project in Lilljuthatten in northern Jamtland. The company is conducting the project on its own and intensive exploration is underway.

The difficult talk of finding replacement jobs in Arjeplog now faces politicians in that municipality.

"We must now become reconciled with the opponents of uranium and solve this problem together," Kurt Burman said.

Wasted

A klinker plant, peat mining, and production of wooden chips are some of the alternatives that have been discussed in recent years, but the governing Social Democrats view these projects as unprofitable.

"Unfortunately, there are no ideas or projects that are comparable to the uranium mine," Burman stated.

LKAB and SKBF have invested almost 25 million kronor in the Pleutajokk mine. This money will have been wasted if the experience gained is not utilized elsewhere in the country.

9336
CSO: 5100/2025 END

END OF FICHE

DATE FILMED

Dec. 15, 1981